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(54) A METHOD, BASE STATION AND USER EQUIPMENT FOR REDUCING A COGNITIVE PILOT CHANNEL BANDWIDTH

VERFAHREN, BASISSTATION UND BENUTZERGERÄT ZUM REDUZIEREN DER BANDBREITE EINES KOGNITIVEN PILOTKANALS

PROCÉDÉ, STATION DE BASE ET ÉQUIPEMENT UTILISATEUR POUR LA RÉDUCTION D'UNE BANDE PASSANTE DE CANAL PILOTE COGNITIF

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EP 2 417 801 B1

Description

Technical Field

[0001] The invention pertains to telecommunication field and concerns a method for reducing a Cognitive Pilot Channel (CPC) bandwidth used for transmitting lists of information to a plurality of meshes of a geographical area comprising at least one base station covering said plurality of meshes to allow a User Equipment camping on a given mesh among said plurality of meshes to select an operator and/or an access technology and/or a communication frequency available in said given mesh.

[0002] The invention also concerns a base station covering a geographical area comprising a plurality of meshes receiving a Cognitive Pilot Channel (CPC) carrying lists of information on operators, access technology and radio frequencies available in each mesh.

[0003] The invention further concerns User Equipment (UE) camping on a mesh of a geographical area comprising a plurality of meshes receiving a Cognitive Pilot Channel (CPC) carrying lists of information on operators, access technology and radio frequencies available in each mesh.

Background Art

[0004] Cognitive Pilot Channel (CPC) is a concept used in cognitive radio to provide information to cognitive mobiles about the available operators, Radio Access Technologies (RAT) and Frequencies available in a geographical area.

[0005] Two Major concepts for Cognitive Pilot Channel are proposed by the E3 project and ETSI RRS Group: Mesh based and Optimised broadcast approach.

- Mesh based concept in which a cell in the geographical area is divided into a plurality of meshes and information is provided about operators, RAT and Frequencies available in each mesh.
- Optimised broadcast concept in which information about all the RATs and frequencies available in the cells is transmitted.

[0006] WO 2008/119380 A1 discloses a method for enabling connection of a mobile communication terminal to a radio communication network, comprising broadcasting through a geographic area information about available radio access networks available in the geographic area, the information being intended to be used by the mobile communication terminal for determining which radio access networks cover a current mobile communication terminal location within the geographic area. The information includes an identifier of at least one radio access network available in the geographic area, and, associated with the identifier of the at least one radio access network, data adapted to determine an extent of coverage of the geographic area by that radio access network.

[0007] US 2002/0089437 A1 discloses a method and apparatus for communicating informations. This may include comparing a current item list with a reference item list and determining a type of classification based on the comparison. That is, the comparison may determine a difference between the current item list and the reference item list. Information regarding this difference may be sent from a first entity to a second entity.

Summary of Invention

Technical Problem

[0008] Although Mesh based concept is more precise than Optimised broadcast concept, it presents a drawback resulting from the fact that the transmission of information to the meshes requires a larger frequency band to be allocated to CPC.

[0009] One of the proposed method to reduce the CPC data rate is to transmit the same CPC for the whole cell, not to meshes of said cell, and transmit the coverage area for each technology and frequency. The problem with this kind of approach is that coverage areas are not easily characterized and transmitting a detailed coverage area may result in a large data-rate as well.

[0010] The present invention aims at reducing the CPC data rate.

[0011] Another object of the invention is to reduce the CPC message length to enable a shorter period between mesh information occurrences for the same bit rate.

[0012] The invention also aims at reducing the required bandwidth for the CPC use while increasing CPC message robustness.

Solution to Problem

[0013] The invention is based on the fact that adjacent meshes usually differ by only few frequencies.

[0014] Thus instead of transmitting the whole information each time, in the method according to the invention, all the information is first transmitted to a reference mesh, and only information about the difference between each mesh is subsequently transmitted to a given mesh.

[0015] This object is achieved by means of a method for reducing a Cognitive Pilot Channel (CPC) bandwidth used for transmitting lists of information to a plurality of meshes of a geographical area comprising at least one base station covering said plurality of meshes to allow a User Equipment camping on a given mesh among said plurality of meshes to select an operator and/or an access technology and/or a communication frequency available in said given mesh.

[0016] The method according to the invention comprises the following steps:

- defining a reference list of information associated to a reference mesh,

- transmitting the reference list of information to the User Equipment,
- determining a difference from the reference mesh by comparing the list of information intended for a mesh which is adjacent to the reference mesh with the reference list of information, and,
- transmitting, to the User Equipment, the determined difference from the reference mesh as the list of information.

[0017] According to a first variant of the invention,

- For i=2 to n, n being the number of meshes in the geographical area, the base station receives information about the operators, the technologies and the frequencies present in each mesh and selects mesh #1 as a reference mesh,
- the base station transmits the complete list of information concerning operators, Radio Access technologies (RAT) and frequencies present in the reference mesh #1,
- For i=2 to n, n being the number of meshes in the geographical area, the base station compares information intended respectively for the mesh #i and mesh #i-1 and derives the differences between the list of information of each mesh and the following mesh,
- the base station transmits said difference to the mesh #i,
- upon reception of said difference, the User Equipment analyses the information intended for the reference mesh, and,
- For i=2 to m, where m is the rank of the mesh in which the UE is located, the UE determines the list of operators, RATs and frequencies present in mesh #m by including all the differences between consecutive meshes.

[0018] According to a second variant of the invention,

- the base station receives information about the operators, the technologies and the frequencies present in each mesh.
- For i=1 to n, n being the number of meshes in the geographical area, the base station compares the list of information intended for a given mesh #m (1<m<n) to the list of information intended for each mesh #i (i=1 to n) and determines the closest mesh #A (A < i) to the given mesh #m and the difference between said closest mesh A and said mesh #m,
- the base station transmits the complete list of information concerning operators, Radio Access technologies (RAT) and frequencies present in the reference mesh #1,
- For i=2 to n, the base station transmits the information intended for the closest mesh #A and the difference in the available operators, RATs and frequencies between said given mesh #m and said closest mesh #A, and,
  upon reception of information intended for the closest mesh #A and the difference in the available operators, RATs and frequencies between the mesh #m and the closest mesh #A,
- the User Equipment determines the list of operators, RATs and frequencies present in mesh #m by including all the differences between said meshes #m and said closest meshes #A.

[0019] Preferably, the closest mesh #A (A < i) is the one whose information list is the closest to the information list of the mesh in which the UE is located.

[0020] In order to avoid error propagation, the base station transmits periodically a plurality of reference meshes to the geographical area.

[0021] The transmission periodicity is chosen depending on the reliability of the Cognitive Pilot Channel decoding.

[0022] The invention is implemented by a base station covering a geographical area comprising a plurality of meshes receiving a Cognitive Pilot Channel (CPC) carrying lists of information on operators, access technology and radio frequencies available in each mesh.

[0023] The base station according to the invention comprises:

- means for defining a reference list of information associated to a reference mesh,
- means for transmitting the reference list of information to the User Equipment,
- means for determining a difference from the reference mesh by comparing the list of information intended for a mesh which is adjacent to the reference mesh with the reference list of information,
- means for transmitting, to the User Equipment, the determined difference from the reference list as the list of information.

[0024] The User Equipment implementing the method according to the invention comprises means for automatically inferring a list of operators, technologies and frequencies available in the mesh in which said User Equipment is located from differences between the list of information intended for a predetermined reference mesh and the list of information intended for the mesh in which said User Equipment is located.

[0025] The forgoing summary, as well as the following detailed description, will be better understood when read in conjunction with the appended figures illustrating an exemplary embodiment of the invention in which:

Brief Description of Drawings

[0026]

[fig.1]- figure 1 schematically represents an area in which the method according to the invention is im-

plemented;

[fig.2]- figure 2 is flow chart illustrating the steps of a first embodiment of the method according to the invention;

[fig.3] - figure 3 is flow chart illustrating the steps of a second embodiment of the method according to the invention.

Description of Embodiments

[0027] The invention will be described when implemented in a geographical area covered by at least one wireless telecommunication network and in which a Cognitive Pilot Channel is used for broadcasting information on the available Radio Access technologies (RATs) and frequencies to allow cognitive receiver such as mobile phones, PDA, or laptops to choose the most convenient RAT and frequency for communicating in the network. Said geographical area is divided into a number M of contiguous elementary meshes.

[0028] As illustrated by figure 1, the geographical area is divided into M=32 (thirty two) contiguous elementary meshes 2 covered by a base station 40 that broadcasts a Cognitive Pilot Channel (CPC) carrying lists of information on operators, access technology and radio frequencies available for each mesh #i (i=1 to 32).

[0029] The processing module of the base station 40 comprises means for defining a reference list of information, means for associating said reference list of information to a reference mesh, means for associating an identifier to said reference mesh.

[0030] Said processing module is provided with software for comparing the list of information intended for any given mesh #i (i=1 to 32) to the list of information comprised in the reference list and for determining the difference between said lists of information.

[0031] In a first embodiment illustrated by figure 1, at step 50, the base station 40 transmits to mesh #1 a list of information indicating the operators, the Radio access technology and the communication frequency available in said mesh #1.

[0032] At step 52, the processing module of the base station sets the information transmission delay between two successive transmission at value D taking into account the size of the geographical area and the transmission conditions in that area.

[0033] At step 54, the processing module checks whether the period D has elapsed or not.

[0034] If the period D has elapsed (arrow 56), the base station transmits the complete list of information to any mesh #i (i=1 to 32).

[0035] At step 60, the processing module increments the rank of the mesh to receive the list of information and compare the current rank (step 62) with the total number (32) of meshes.

If all the meshes have received the list of information, the base station stops transmitting said lists (step 64), else, the process is resumed from step 54.

[0036] If the period D has not elapsed (arrow 68), for a given mesh #i (2<i<32), at step (70) the processing module compares the list of information intended for said mesh #i to the list of information intended for the prceeding mesh (#i-1).

[0037] If the lists compared are identical (arrow 72), the processing module considers that the list to transmit to mesh #i is the list of information previously transmitted to mesh #i-1 (step 73).

[0038] Else, the base station transmits to mesh #i the information which is present in the list of mesh #i but absent from the list of mesh #i-1 (step 74).

[0039] At step 60, the processing module increments the rank of the mesh to receive the list of information and compare the current rank (step 62) with the total number (32) of meshes.

[0040] If all the meshes have received the list of information, the base station stops transmitting said lists (step 64), else, the process is resumed from step 54.

[0041] Figure 2 is a flow chart illustrating the steps of a second embodiment of the method according to the invention comprising identical steps 50-68 as the first embodiment.

[0042] This second embodiment differs from the first embodiment by the steps 80 to 90 which will be described below.

[0043] At step 80, for a given mesh #i (i=2 to 32) the processing module determine a reference mesh which is not necessary the preceding mesh #i-1.

[0044] In this embodiment, the reference mesh is the closest mesh #A (A<i) to said mesh #i in the sense that the difference between the list of information intended for mesh #i and the list of information intended for mesh #A is minimum.

[0045] The closest mesh #A (A<i) is determined by means of a specific software programmed in the processing module and in the UE equipments roaming in the geographical area.

[0046] At step 82, the processing module compares the list of information intended for said mesh #i to the list of information intended for the the closest mesh #A (A<i).

[0047] If the lists compared are identical (arrow 84), the processing module considers that the list to transmit to mesh #i is the list previously transmitted to mesh #A (step 86).

[0048] Else (arrow 90), the base station transmits to mesh #i the information which is present in the list of information intended for mesh #i and absent from the list of mesh #A.

[0049] At step 60, the processing module increments the rank of the mesh to receive the list of information and compare the current rank (step 62) with the total number (32) of meshes.

[0050] If all the meshes have received the list of information, the base station stops transmitting said lists (step 64), else, the process is resumed from step 54.

[0051] It is to be noted that the User Equipment implementing the method according to the invention should

comprises means for automatically inferring a list of operators, technologies and frequencies available in the mesh in which it is located from differences between the list of information intended for the predetermined reference mesh and the list of information intended for the mesh in which it is located.

Claims

1. A method for reducing a Cognitive Pilot Channel, CPC, bandwidth used for transmitting lists of information to a plurality of meshes wherein each mesh is covered by a base station (40) to which a User Equipment is camping on, said method **characterized by** the following steps:

   - defining a reference list of information associated to a reference mesh,
   - transmitting the reference list of information to the User Equipment,
   - determining a difference from the reference mesh by comparing the list of information intended for a mesh which is adjacent to the reference mesh with the reference list of information, and,
   - transmitting, to the User Equipment, the determined difference from the reference mesh as the list of information.

2. Method according to claim 1 further comprising the following steps:

   - determining difference from the adjacent mesh by comparing the list of information intended for a mesh adjacent to the adjacent mesh with the list of information of the adjacent mesh,
   - transmitting, to the User Equipment, the determined difference to the adjacent mesh as the list of information.

3. Method according to claim 1, wherein the list of information includes list of operators and/or technologies and/or frequencies available.

4. Method according to claim 1 further comprising the following steps:

   - the User Equipment receives the determined difference from the reference mesh and the reference list, and
   - infers a complete list of the given mesh based on the determined difference from the reference mesh and the reference list.

5. Method according to claim 2 further comprising the following steps:

   - the User Equipment receives the determine difference from the adjacent mesh, the determined difference from the reference mesh, and the reference list, and infers a complete list of the mesh in which the User Equipment is located based on the determined difference from adjacent mesh, the determined difference from the reference mesh and the reference list.

6. Method according to claim 4 or 5, wherein a complete list includes operators and/or technologies and/or frequencies available to the User Equipment.

7. Method according to claim 1 further comprising the following steps:

   - For i=1 to n, n being the number of meshes in the area covered by a base station (40), the base station (40) receives information of each mesh and selects mesh #1 as a reference mesh,
   - the base station (40) transmits the complete list of information of the reference mesh #1, and,
   - For i=2 to n, the base station (40) derives the differences between the list of information of mesh #i and the list of information of mesh #i-1, and,
   - the base station (40) transmits the differences.

8. Method according to claim 7 further comprising the following step:

   - the UE determines the list of information of mesh #m wherein the UE is located by the reference list and the differences between mesh #i and mesh #i-1, i=2 to m.

9. Method according to claim 1 further comprising the following steps:

   - for i=1 to n, n being the number of meshes in the area covered by a base station (40), the base station (40) receives information of each mesh and selects mesh #1 as a reference mesh,
   - the base station (40) transmits the complete list of information of the reference mesh #1, and,
   - for i=2 to n, the base station (40) derives the differences between the list of information of mesh #i and the list of information of the closest mesh #A, A<i, to mesh #i, and,
   - the base station (40) transmits the differences.

10. Method according to claim 8 further comprising the following step:

    - the UE determines the list of information of mesh #m wherein the UE is located by the reference list and the differences between mesh #i and mesh #i-1, i=2 to B, wherein the B is the number of the closest mesh to mesh #m.

11. Method according to claim 8 wherein the period of the transmission of the list of information is chosen depending on the reliability of the Cognitive Pilot Channel decoding.

12. A base station (40) for reducing a Cognitive Pilot Channel, CPC, bandwidth used for transmitting lists of information to a plurality of meshes wherein each mesh is covered by at least one base station (40) to which a User Equipment is camping on, the base station (40) **characterized in that** it comprises:

- means for defining a reference list of information associated to a reference mesh,
- means for transmitting the reference list of information to the User Equipment,
- means for determining a difference from the reference mesh by comparing the list of information intended for a mesh which is adjacent to the reference mesh with the reference list of information,
- means for transmitting, to the User Equipment, the determined difference from the reference list as the list of information.

13. A base station (40) according to claim 12 further comprising:

- means for determining difference from the adjacent mesh by comparing the list of information intended for a mesh adjacent to the adjacent mesh with the list of information of the adjacent mesh,
- means for transmitting the determined difference from the adjacent mesh as the list of information.

14. A base station (40) according to claim 13, wherein the list of information includes list of operators and/or technologies and/or frequencies available.

15. User Equipment for reducing a Cognitive Pilot Channel, CPC, bandwidth used for transmitting lists of information to a plurality of meshes wherein each mesh is covered by a base station (40) to which the User Equipment is camping on, the User Equipment **characterized in that** it comprises:

- means for receiving a reference list of a reference mesh and a determined difference of the reference list and the list of information intended for the mesh in which the User Equipment is located,
- means for inferring a complete list of the mesh wherein the User Equipment is located based on the determined difference from the reference mesh and the reference list.

16. User Equipment according to claim 15 further comprising:

- means for receiving a reference list of a reference mesh and a determined difference from adjacent mesh in which the User Equipment is located.

17. User Equipment according to claim 15, wherein the complete list includes operators and/or technologies and/or frequencies available to the User Equipment.

Patentansprüche

1. Verfahren zum Reduzieren der Bandbreite eines kognitiven Pilotkanals CPC, die zum Senden von Informationslisten zu mehreren Netzen verwendet wird, wobei jedes Netz durch eine Basisstation (40) abgedeckt wird, worauf ein Endgerät angeordnet ist, wobei das Verfahren durch die folgenden Schritte gekennzeichnet ist:

- Definieren einer Referenzinformationsliste in Zusammenhang mit einem Referenznetz,
- Senden der Referenzinformationsliste zum Endgerät,
- Bestimmen einer Differenz von dem Referenznetz durch Vergleichen der für ein Netz, das an das Referenznetz angrenzt, vorgesehenen Informationsliste mit der Referenzinformationsliste und
- Senden der bestimmten Differenz von dem Referenznetz als die Informationsliste zum Endgerät.

2. Verfahren nach Anspruch 1, welches ferner die folgenden Schritte aufweist:

- Bestimmen der Differenz von dem angrenzenden Netz durch Vergleichen der für ein Netz, das an das angrenzende Netz angrenzt, vorgesehenen Informationsliste mit der Informationsliste des angrenzenden Netzes,
- Senden der bestimmten Differenz zum angrenzenden Netz als die Informationsliste zum Endgerät.

3. Verfahren nach Anspruch 1, wobei die Informationsliste eine Liste von Betreibern und/oder Technologien und/oder verfügbaren Frequenzen aufweist.

4. Verfahren nach Anspruch 1, welches ferner die folgenden Schritte aufweist:

- das Endgerät empfängt die bestimmte Differenz von dem Referenznetz und die Referenzliste und

- leitet eine vollständige Liste des gegebenen Netzes auf der Grundlage der bestimmten Differenz von dem Referenznetz und der Referenzliste ab.

5. Verfahren nach Anspruch 2, welches ferner folgende Schritte aufweist:

- das Endgerät empfängt die bestimmte Differenz von dem angrenzenden Netz, die bestimmte Differenz von dem Referenznetz und die Referenzliste und leitet eine vollständige Liste des Netzes, in dem sich das Endgerät befindet, auf der Grundlage der bestimmten Differenz von dem angrenzenden Netz, der bestimmten Differenz von dem Referenznetz und der Referenzliste ab.

6. Verfahren nach Anspruch 4 oder 5, wobei eine vollständige Liste Betreiber und/oder Technologien und/oder Frequenzen, die für das Endgerät verfügbar sind, aufweist.

7. Verfahren nach Anspruch 1, welches ferner die folgenden Schritte aufweist:

- für i = 1 bis n, wobei n die Anzahl der Netze in dem durch eine Basisstation (40) abgedeckten Bereich ist, empfängt die Basisstation (40) Informationen jedes Netzes und wählt das Netz #1 als ein Referenznetz aus,
- die Basisstation (40) sendet die vollständige Informationsliste des Referenznetzes #1, und
- für i = 2 bis n leitet die Basisstation (40) die Differenzen zwischen der Informationsliste des Netzes #i und der Informationsliste des Netzes #i-1 ab, und
- die Basisstation (40) überträgt die Differenzen.

8. Verfahren nach Anspruch 7, welches ferner folgenden Schritt aufweist:

- das UE (Endgerät) bestimmt die Informationsliste des Netzes #m, worin sich das UE befindet, durch die Referenzliste und die Differenzen zwischen dem Netz #i und dem Netz #i-1, i = 2 bis m.

9. Verfahren nach Anspruch 1, welches ferner die folgenden Schritte aufweist:

- für i = 1 bis n, wobei n die Anzahl der Netze in dem durch eine Basisstation (40) abgedeckten Bereich ist, empfängt die Basisstation (40) Informationen jedes Netzes und wählt das Netz #1 als ein Referenznetz aus,
- die Basisstation (40) sendet die vollständige Informationsliste des Referenznetzes #1, und
- für i = 2 bis n leitet die Basisstation (40) die Differenzen zwischen der Informationsliste des Netzes #i und der Informationsliste des nächstgelegenen Netzes #A, A < i, zum Netz #i ab, und
- die Basisstation (40) überträgt die Differenzen.

10. Verfahren nach Anspruch 8, welches ferner den folgenden Schritt aufweist:

- das UE bestimmt die Informationsliste des Netzes #m, in dem sich das UE befindet, durch die Referenzliste und die Differenzen zwischen dem Netz #i und dem Netz #i-1, i = 2 bis B, wobei B die Nummer des nächstgelegenen Netzes zum Netz #m ist.

11. Verfahren nach Anspruch 8, wobei die Übertragungs-periode der Informationsliste abhängig von der Zuverlässigkeit der Decodierung des kognitiven Pilotkanals ausgewählt wird.

12. Basisstation (40) zum Reduzieren der Bandbreite eines kognitiven Pilotkanals CPC, die zum Senden von Informationslisten zu mehreren Netzen verwendet wird, wobei jedes Netz durch eine Basisstation (40) abgedeckt wird, worauf ein Endgerät angeordnet ist, wobei die Basisstation (40) **dadurch gekennzeichnet ist, dass** sie Folgendes aufweist:

- Mittel zum Definieren einer Referenzinformationsliste verknüpft mit einem Referenznetz,
- Mittel zum Senden der Referenzinformationsliste zum Endgerät,
- Mittel zum Bestimmen einer Differenz von dem Referenznetz durch Vergleichen der für ein Netz, das an das Referenznetz angrenzt, vorgesehenen Informationsliste mit der Referenzinformationsliste und
- Mittel zum Senden der bestimmten Differenz von dem Referenznetz als die Informationsliste zum Endgerät.

13. Basisstation (40) nach Anspruch 12, welche ferner aufweist:

- Mittel zum Bestimmen der Differenz von dem angrenzenden Netz durch Vergleichen der für ein Netz, das an das angrenzende Netz angrenzt, vorgesehenen Informationsliste mit der Informationsliste des angrenzenden Netzes,
- Mittel zum Senden der bestimmten Differenz zum angrenzenden Netz als die Informationsliste zum Endgerät.

14. Basisstation (40) nach Anspruch 13, wobei die Informationsliste eine Liste von Betreibern und/oder Technologien und/oder verfügbaren Frequenzen aufweist.

15. Endgerät zum Reduzieren der Bandbreite eines kognitiven Pilotkanals CPC, die zum Senden von Informationslisten zu mehreren Netzen verwendet wird, wobei jedes Netz durch eine Basisstation (40) abgedeckt wird, worauf ein Endgerät angeordnet ist, wobei das Endgerät **dadurch gekennzeichnet ist, dass** es Folgendes aufweist:

- Mittel zum Empfangen einer Referenzliste eines Referenznetzes und einer bestimmten Differenz der Referenzliste und der für das Netz vorgesehenen Informationsliste, worin sich das Endgerät befindet,
- Mittel zum Ableiten einer vollständigen Liste des Netzes, worin sich das Endgerät befindet, auf der Grundlage der bestimmten Differenz von dem Referenznetz und der Referenzliste.

16. Endgerät nach Anspruch 15, welches ferner aufweist:

- Mittel zum Empfangen einer Referenzliste eines Referenznetzes und einer bestimmten Differenz von dem benachbarten Netz, in dem sich das Endgerät befindet.

17. Endgerät nach Anspruch 15, wobei die vollständige Liste Betreiber und/oder Technologien und/oder Frequenzen, die für das Endgerät verfügbar sind, aufweist.

Revendications

1. Procédé de réduction d'une bande passante de canal pilote cognitif, CPC utilisée pour transmettre des listes d'informations à une pluralité de mailles, où chaque maille est couverte par une station de base (40) à laquelle un équipement utilisateur est relié, ledit procédé étant **caractérisé par** les étapes suivantes :

- définition d'une liste d'informations de référence associée à une maille de référence,
- transmission de la liste d'informations de référence à l'équipement utilisateur,
- détermination d'une différence par rapport à la maille de référence en comparant la liste d'informations prévue pour une maille qui est adjacente à la maille de référence avec la liste d'informations de référence, et
- transmission, à l'équipement utilisateur, de la différence déterminée par rapport à la maille de référence en tant que liste d'informations.

2. Procédé selon la revendication 1, comprenant en outre les étapes suivantes :

- détermination de la différence par rapport à la maille adjacente en comparant la liste d'informations prévue pour une maille adjacente à la maille adjacente avec la liste d'informations de la maille adjacente,
- transmission, à l'équipement utilisateur, de la différence déterminée concernant la maille adjacente en tant que liste d'informations.

3. Procédé selon la revendication 1, dans lequel la liste d'informations comprend une liste d'opérateurs et/ou de technologies et/ou de fréquences disponibles.

4. Procédé selon la revendication 1, comprenant en outre les étapes suivantes :

- l'équipement utilisateur reçoit la différence déterminée par rapport à la maille de référence et la liste de référence, et
- infère une liste complète de la maille donnée basée sur la différence déterminée par rapport à la maille de référence et la liste de référence.

5. Procédé selon la revendication 2, comprenant en outre les étapes suivantes :

- l'équipement utilisateur reçoit la différence déterminée par rapport à la maille adjacente, la différence déterminée par rapport à la maille de référence, et la liste de référence, et infère une liste complète de la maille dans laquelle l'équipement utilisateur est situé basée sur la différence déterminée par rapport à la maille adjacente, la différence déterminée par rapport à la maille de référence et la liste de référence.

6. Procédé selon la revendication 4 ou 5, dans lequel une liste complète comprend des opérateurs et/ou des technologies et/ou des fréquences disponibles pour l'équipement utilisateur.

7. Procédé selon la revendication 1, comprenant en outre les étapes suivantes :

- pour i = 1 à n, n étant le nombre de mailles dans la zone couverte par une station de base (40), la station de base (40) reçoit des informations de chaque maille et sélectionne la maille n° 1 en tant que maille de référence,
- la station de base (40) transmet la liste complète d'informations de la maille de référence n° 1, et
- pour i = 2 à n, la station de base (40) déduit les différences entre la liste d'informations de la maille n° i et la liste d'informations de la maille n° i-1, et
- la station de base (40) transmet les différences.

8. Procédé selon la revendication 7, comprenant en outre l'étape suivants :

- l'EU détermine la liste d'informations de la maille n° m où l'EU est situé par la liste de référence et les différences entre la maille n° i et la maille n° i-1, i = 2 à m.

9. Procédé selon la revendication 1, comprenant en outre les étapes suivantes :

- pour i = 1 à n, n étant le nombre de mailles dans la zone couverte par une station de base (40), la station de base (40) reçoit des informations de chaque maille et sélectionne la maille n° 1 en tant que maille de référence,
- la station de base (40) transmet la liste complète d'informations de la maille de référence n° 1, et
- pour i = 2 à n, la station de base (40) déduit les différences entre la liste d'informations de la maille n° i et la liste d'informations de la maille n° A la plus proche, A < i, de la maille n° i, et
- la station de base (40) transmet les différences.

10. Procédé selon la revendication 8, comprenant en outre l'étape suivants :

- l'UE détermine la liste d'informations de la maille n° m où l'EU est situé par la liste de référence et les différences entre la maille n° i et la maille n° i-1, i = 2 à B, où B est le nombre de mailles les plus proches de la maille n° m.

11. Procédé selon la revendication 8, dans lequel la période de la transmission de la liste d'informations est choisie en fonction de la fiabilité du décodage de canal pilote cognitif.

12. Station de base (40) permettant de réduire une bande de passante de canal pilote cognitif, CPC, utilisée pour transmettre des listes d'informations à une pluralité de mailles, où chaque maille est couverte par au moins une station de base (40) à laquelle un équipement utilisateur est relié, la station de base (40) étant **caractérisée en ce qu'**elle comprend :

- un moyen permettant de définir une liste d'informations de référence associées à une maille de référence,
- un moyen permettant de transmettre la liste d'informations de référence à l'équipement utilisateur,
- un moyen permettant de déterminer une différence par rapport à la maille de référence en comparant la liste d'informations prévue pour une maille qui est adjacente à la maille de référence avec la liste d'informations de référence,
- un moyen permettant de transmettre, à l'équipement utilisateur, la différence déterminée par rapport à la liste de référence en tant que liste d'informations.

13. Station de base (40) selon la revendication 12, comprenant en outre :

- un moyen permettant de déterminer la différence par rapport à la maille adjacente en comparant la liste d'informations prévue pour une maille adjacente à la maille adjacente avec la liste d'informations de la maille adjacente,
- un moyen permettant de transmettre la différence déterminée par rapport à la maille adjacente en tant que liste d'informations.

14. Station de base (40) selon la revendication 13, dans laquelle la liste d'informations comprend une liste d'opérateurs et/ou de technologies et/ou de fréquences disponibles.

15. Equipement utilisateur permettant de réduire une bande passante de canal pilote cognitif, CPC, utilisée transmettre des listes d'informations à une pluralité de mailles, où chaque maille est couverte par une station de base (40) à laquelle l'équipement utilisateur est relié, l'équipement utilisateur étant **caractérisé en ce qu'**il comprend :

- un moyen permettant de recevoir une liste de référence d'une maille de référence et une différence déterminée de la liste de référence et la liste d'informations prévue pour la maille dans laquelle l'équipement utilisateur est situé,
- un moyen permettant d'inférer une liste complète de la maille dans laquelle l'équipement utilisateur est situé en se basant sur la différence déterminée par rapport à la maille de référence et la liste de référence.

16. Equipement utilisateur selon la revendication 15, comprenant en outre :

- un moyen permettant de recevoir une liste de référence d'une maille de référence et une différence déterminée par rapport à une maille adjacente dans laquelle l'équipement utilisateur est situé.

17. Equipement utilisateur selon la revendication 15, dans lequel la liste complète comprend des opérateurs et/ou des technologies et/ou des fréquences disponibles pour l'équipement utilisateur.

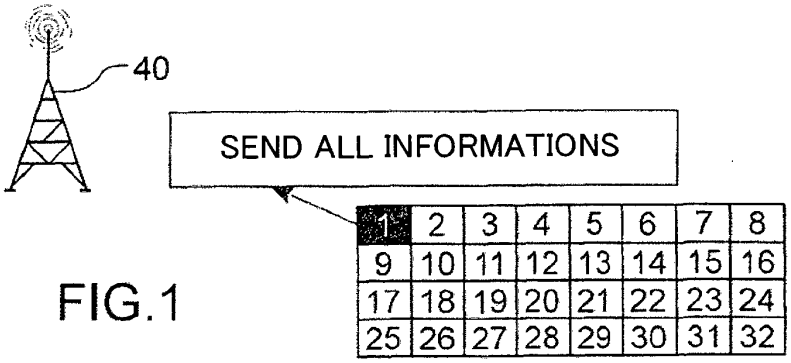
40
SEND ALL INFORMATIONS
1 2 3 4 5 6 7 8
9 10 11 12 13 14 15 16
17 18 19 20 21 22 23 24
25 26 27 28 29 30 31 32

FIG.1

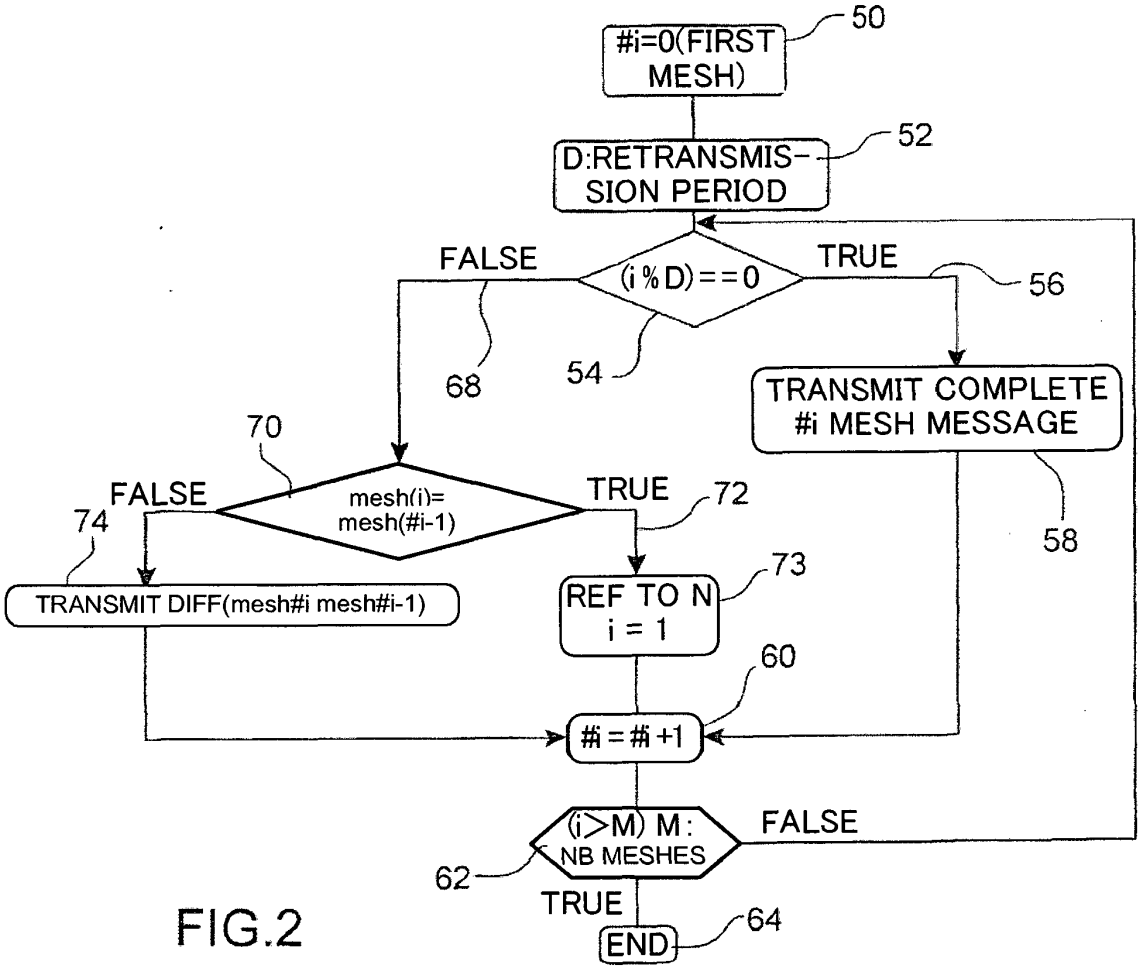
#i=0(FIRST MESH)
50
D:RETRANSMIS-SION PERIOD
52
FALSE
(i%D)==0
TRUE
56
68
54
TRANSMIT COMPLETE #i MESH MESSAGE
70
FALSE
mesh(i)= mesh(#i-1)
TRUE
72
74
58
TRANSMIT DIFF(mesh#i mesh#i-1)
REF TO N i = 1
73
60
#i=#i+1
(i>M) M: NB MESHES
FALSE
62
TRUE
END
64

FIG.2

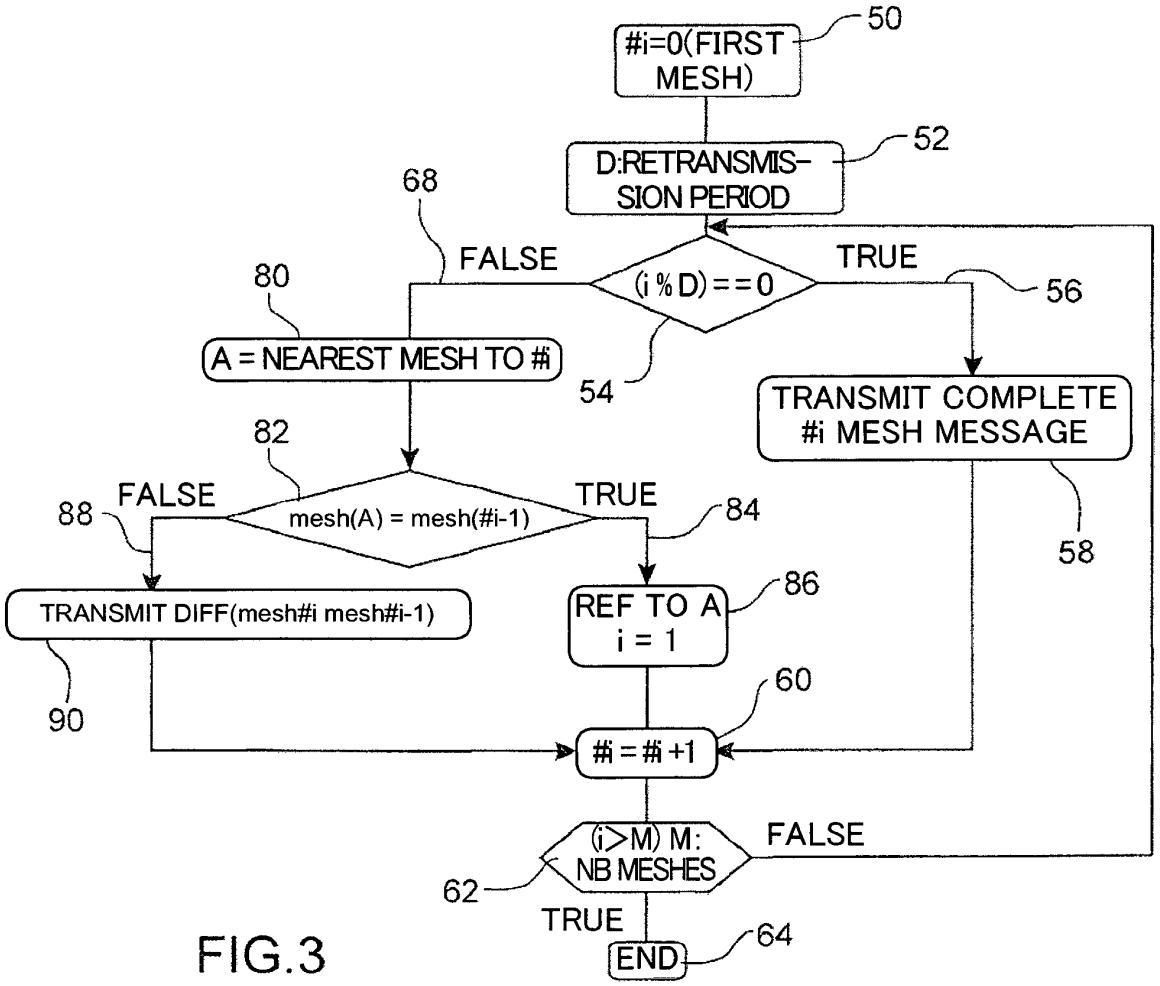
#i=0(FIRST MESH)
50
D:RETRANSMIS-SION PERIOD
52
68
FALSE
(i % D) = = 0
TRUE
56
80
A = NEAREST MESH TO #i
54
TRANSMIT COMPLETE #i MESH MESSAGE
82
FALSE
mesh(A) = mesh(#i-1)
TRUE
88
84
58
TRANSMIT DIFF(mesh#i mesh#i-1)
REF TO A i = 1
86
90
60
#i = #i +1
(i>M) M: NB MESHES
FALSE
62
TRUE
END
64

FIG.3

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- WO 2008119380 A1 **[0006]**
- US 20020089437 A1 **[0007]**